


# The effect of fear of contagion/being contagious on depression, anxiety and stress levels of university students during the COVID-19 pandemic

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## Abstract

**Background:** University students are generally quite active in social life. It is thought that their fear of contagion/being contagious will affect their depression, anxiety and stress levels due to the removal of restrictions and the increase in individual responsibilities. This study aims to determine the effect of fear of contagion/being contagious on depression, anxiety and stress levels of university students during the COVID-19 pandemic.

**Methods:** This study, descriptive and cross-sectional. Quantitative data were collected using the Demographic Information Form, the Fear of Contagion/Transmission Scale and the Depression-Anxiety-Stress Scale. The sample included 3500 participants. Descriptive statistics were used for the presentation of the results. The STROBE checklist for cross-sectional studies was used in this study.

**Results:** This study revealed that the depression, anxiety and stress levels of university students were above normal, and these results were mostly associated with females, those with a chronic disease and high fear of contagion/being contagious.

**Conclusion:** The findings of this study may be useful for precautionary plans to support the psychological health of university students after the COVID-19 pandemic and in the fight against possible new pandemics. Considering the findings of our study, educational programs should be planned for youth in general and university students in particular to deal with depression, anxiety, stress and fears.

**Relevance to Clinical Practice:** The depression, anxiety and stress levels of university students were above normal. As the fear of contamination and contagion increases, the level of depression, anxiety and stress increases. Those with chronic diseases have high levels of depression, anxiety and stress.

**Patient or Public Contribution:** Research data were collected through an online questionnaire. Data collection tools were prepared on Google Forms, and then, links were shared with student groups over social media. Students shared the link on their social platforms, allowing it to reach wider audiences.

## KEYWORDS

anxiety and stress, being contagious, depression, fear of contagion, university students

## 1 | INTRODUCTION

The COVID-19 outbreak was declared a pandemic by the World Health Organization (WHO) on 11 March 2020, and it has affected the whole world (Ministry of Health of Turkey, 2021). After the first case was seen in Turkey, The Ministry of Health and other leading health authorities published procedures to fight against the virus and called people to comply with mask, distance and hygiene rules to reduce the spread of the virus which is transmitted from person to person rapidly (UNESCO, 2020; World Health Organization, 2020a, 2020b, 2020c). As the pandemic persisted, new decisions were taken in line with the number of cases and developments in treatment, and the restrictions were shared with the community.

It was announced that the 2021–2022 academic year will re-continue education face-to-face with the press release of the Higher Education Council of Turkey. As of September 2021, students started face-to-face education by complying to mask, distance and hygiene rules. Along with the fact that the effect of the COVID-19 outbreak has decreased, and it has a less impact on social life than before thanks to widespread vaccination, it has been decided to completely lift the mask requirement in indoor and outdoor areas, including all schools in line with the recommendations of the COVID-19 Scientific Advisory Board dated 26 April 2022 (Ministry of Internal Affairs, 2022a). In the circular of the Ministry of Internal Affairs dated 30 May 2022, the obligation to use masks in public transportation was lifted, and it was stated that the use of masks should continue in health institutions (Ministry of Internal Affairs, 2022b).

Studies show that university students experience increased levels of depression, anxiety and stress (Asif et al., 2020; Mahmoud et al., 2012; Ramón-Arhués et al., 2020). Worldwide, it is estimated that 12%–50% of college students have at least one diagnostic criterion for one or more mental problems (Bruffaerts et al., 2018). The age group of university students has been defined as emerging adulthood, which is called a transition period between late adolescence and adulthood. This transition, which requires the development of skills to manage new tasks related to maintaining the independence, self-efficacy and developing close relationships that the individual gained during adolescence, can cause stress and anxiety (Mahmoud et al., 2012). However, university students face numerous academic, financial and social stressors that can negatively affect their mental health, such as examinations, workload, lack of free time, competition and failure to meet parents' expectations (Dusselier et al., 2005; Kruisselbrink Flatt, 2013). In summary, university students face numerous developmental challenges and tasks in their lives (Mahmoud et al., 2012).

Even in non-pandemic conditions, pandemic conditions pose a greater risk of experiencing psychological problems for university

### What does this paper contribute to the wider global community?

- University students worldwide are grappling with the COVID-19 pandemic, and it has social and personal consequences.
- Despite the fact that 2 years have passed since the COVID-19 pandemic, the high level of fear of infection, depression, stress and anxiety becomes an important issue to be considered in order to ensure the optimal recovery of the young population in the society.
- Knowing how the current pandemic process affects university students provides information to all educators and contributes to the planning of educational activities.

students who experience high stress, anxiety and depression. A study conducted with university students has shown that students are exposed to intense stress during the COVID-19 pandemic, and the main stress factors are related to income, daily life changes and academic difficulties (Cao et al., 2020). On the contrary, in a study by Lovrić et al. (2020) examining the effects of the pandemic on the academic process and psychology of the students, it has been determined that the students are afraid that the virus would infect their families. Also, a study conducted with university students in Israel has shown that students are afraid of and worried about catching COVID-19 (Savitsky et al., 2020).

The COVID-19, which is easily transmitted and spread rapidly, has caused many deaths and lead to profound changes in social, economic and cultural life. Individual responsibilities have increased with the removal of restrictions, so behavioural responses have also changed (Wheaton et al., 2021). Studies show that fear of an illness and associated behavioural changes can also spread virally (Asmundson & Taylor, 2020). Fear of contamination/contagion/being contagious is considered to be the fear of coming into direct or indirect contact with a person or substance that is thought to be infected or harmful, but a thought-oriented fear of contagion may develop in people without the need for a concrete external source (Bauman, 2003; Genç, 2010). The constant control of oneself due to the fear of contamination and to protect from the disease may lead to depression, anxiety and stress (Rachman, 2006). Depression, anxiety, and stress are considered to be common emotional disorders. However, these problems arise in various ways. It can appear as withdrawal and isolation in some cases, while in others it can be seen with symptoms of hyperactivity and tension (Akın & Çetin, 2007).

University students are generally quite active in social life. It is thought that their fear of contagion/being contagious will affect

their depression, anxiety and stress levels due to the removal of restrictions and the increase in individual responsibilities. COVID-19 is the most important health problem of today, and many studies have been conducted with different groups on depression, anxiety and stress levels related to COVID-19 (Thornton et al., 2021; Xiao et al., 2020; Xu et al., 2020; Zhang et al., 2021). However, no study has been found that examines the effects of university students' fear of contagion/being contagious on their depression, anxiety and stress levels. This study aims to determine the effect of fear of contagion/being contagious on depression, anxiety and stress levels of university students during the COVID-19 pandemic.

## 2 | METHODS

### 2.1 | Study design

This descriptive and cross-sectional research was carried out between April 2022 and May 2022 with a structured online questionnaire. The sample of the study consisted of students who had access to the questionnaire via the Internet, volunteered to participate in the study, and continued their associate degree students and undergraduate degree students. The STROBE checklist for cross-sectional studies was used in this study.

### 2.2 | Population and sample of the research

The population of the study was 7,541,890 university students studying in Turkey (Council of Higher Education, 2022). The sample of the study consisted of university students who accepted to participate in the study between April 2022 and May 2022 and were determined with the convenience sampling method. Snowball sampling method, which is one of the non-random sampling methods, was used as the sampling method. In the snowball sampling method, reference people are selected regarding the subject of the study and other people are reached through these people (10, 11). First of all, we communicated with university students around us via social media tools. Then, the sample was reached in the way of reaching the students they know. It is predicted that in choosing this method, there will be difficulties in reaching university students and that accessibility through peers will increase. In this direction, university students reached through the whatsapp application created reference persons and data were collected by sending questionnaires to other university students through them. Inclusion criteria for the study were as follows: agreeing to participate in the study, being an associate and undergraduate student and filling out the online questionnaire completely. Exclusion criteria were as follows: being a graduate, doctoral student and not answering the entire questionnaire sent online. In addition, the OpenEpi program was used to determine the sample size in a more systematic way. The sample size was calculated with the OpenEpi sample calculation program used in the computer environment, with a 50% observation rate, 5%

standard deviation and 99.99% power range, and resulted that 1514 students would constitute the study sample (Sullivan et al., 2013). The study was completed with 3500 students who met the inclusion criteria and agreed to participate in the study.

### 2.3 | Instruments

The data of the study were collected using the Demographic Information Form, the Fear of Contagion/Transmission Scale and the Depression-Anxiety-Stress Scale.

#### 2.3.1 | Demographic information form

The form was prepared in line with the literature in order to collect information about the socio-demographic characteristics of the participants. Demographics help us better understand and group participants, revealing which population our goals and targets affect. There are seven questions in the form that constitute the independent variables of the research. These; gender, age, grade level, form teaching, teaching area, housing status and chronic disease status.

#### 2.3.2 | Fear of contagion/transmission scale (FCTS)

The scale was developed by Koç and Bilgehan. The answer choices of the 24-item five-point Likert-type 'Fear of contagion/transmission scale' are from strongly disagree (1) to strongly agree (5). The minimum score that can be obtained from the scale is 24, and the maximum score is 120. As the score obtained from the scale increases, the fear of contagion/transmission increases. The scale has four sub-dimensions: fear of contagion by contact, abstract fear of contagion, fear of social contagion and fear of contagion in healthcare areas (Koç & Bilgehan, 2021). Koç and Bilgehan used the Cronbach Alpha internal consistency coefficient to calculate the reliability of the Fear of Contagion/Contagion scale. They determined the total Cronbach's alpha reliability coefficient of the fear of contagion/contagion scale as  $\alpha = .909$ . In order to determine whether the scale is suitable for factor analysis, Kaiser-Meyer-Olkin (KMO) sample fit test and Bartlett's sphericity test were performed and the diagonal values of the anti-image correlation matrix were examined. The results show that the scale is suitable for factor analysis (KMO: .911 and Bartlett's test of sphericity: .000). In order to determine the number of factors that can reveal the relationship between the items, scree plot, eigenvalue and variance percentages were used. Varimax Vertical Rotation Technique was used by applying factor analysis to the items. The scale consists of 24 items and four sub-dimensions as a result of validity and reliability analysis. When the Cronbach Alpha values of the sub-dimensions of the scale were examined, it was found that the first factor (fear of contact contamination) was .748, the second factor (fear of abstract contamination) was .791, the third factor (fear of social contamination) was .857

and the fourth factor (fear of contamination in healthcare) was .745. Permission was obtained from the authors of the scale to use it.

### 2.3.3 | Depression-Anxiety-Stress scale (DASS)

The DASS scale to be used in the research was developed by Lovibond & Lovibond (1995); its Turkish validity and reliability were conducted by Akin and Çetin. The scale has 42 items and three sub-dimensions: 14 items for depression, 14 for anxiety and 14 for stress. Students are asked to evaluate their last week. Each item is rated on a four-point Likert-type scale: '0-Did not apply to me at all', '1-Applied to me to some degree, or some of the time', '2-Applied to me to a considerable degree, or a good part of the time', and '3-Applied to me very much, or most of the time'. There are no reverse-rated items, and the total scores of the scale range from 0 to 42 for each sub-dimension. The high scores obtained from each of the depression, anxiety and stress dimensions of the scale reveal that the individual has a related problem (Akin & Çetin, 2007). Permission was obtained from the scale's authors to use it.

## 2.4 | Data collection

The study data were collected through an online survey. Data collection tools were prepared on Google Forms, and then, the link was shared with student groups via WhatsApp. When students followed the link, they were directed to a section informing them about the study briefly and asking for their consent to participate in the study voluntarily. After their approval, they were asked to fill in the Turkish forms. Only defined e-mail addresses of the researchers were allowed to see the filled forms on Google Forms to protect the privacy of the participants. With the data collection form created on the Google form, it was tried to reach university students via WhatsApp.

## 2.5 | Statistical analysis

IBM SPSS Statistics (Version 23.0.; IBM Corp.) package program was used for statistical analysis. Categorical data were expressed as numbers and percentages. On the contrary, numerical data were determined with the mean standard deviation if they were normally distributed, and with the median value (interquartile range of 25–75) if they were not normally distributed. In the evaluation of the data, numbers, percentage distributions, mean and standard deviation values were calculated. The 'significance test of the difference between two means' was used in pairwise comparisons of numerical variables. The one-way ANOVA test was used to compare more than two groups. First of all, the one-way ANOVA test was used to examine homogeneous distribution, then the Tukey test was used in post hoc analysis of homogeneously distributed variables, and the Tamhane's-2 test was used in post hoc analysis of non-homogeneous variables. The relationship between the scales was evaluated with

Pearson correlation analysis. The data were accepted as statistically significant if  $p < .05$ .

## 2.6 | Ethical consideration

Ethics committee approval was obtained to conduct the study (dated 04.12.2022 and 2022/877). Before filling out the data collection tools, information was given about the study on the first page of the online documents, and the students were asked to mark the statement 'I approve to participate in the study' if they agreed to participate in the study it was explained to the students that they had the right to withdraw from the study at any stage of the study, and that the data would be kept in a double-locked and password-protected file in the research team's library for 5 years, and it was stated that participation in the study was on a voluntary basis. Students who completed the form online were deemed to be accepted to participate in the research. It was stated that the students would not be charged any fees for research purposes. There was no conflict of interest between researchers and students.

## 3 | RESULTS

3500 students participated in the research, and 62.5% of them were female. 7.4% of the students participating in the study were in the preparatory class. 28.4% were in 1st grade. 39% were in 2nd grade. 11.1% were in the 3rd grade, and 14.1% were in the 4th grade and above. While the majority of the students (80.5%) were educated in (daytime) formal education, 19.5% of them continue their education in evening education. Considering the study fields of the students participating in the study, the majority of the students (45.2%) were in the field of health sciences, 25% in educational sciences, 17.1% in social sciences and 12.6% in science. 304 (8.7%) of the students had a chronic disease (Table 1).

Table 2 shows the participants' total mean scores of fear of contagion by contact ( $18.87 \pm 5.75$ ), abstract fear of contagion ( $19.12 \pm 6.68$ ), fear of social contagion ( $30.16 \pm 9.61$ ), fear of contagion in healthcare ( $17.45 \pm 5.89$ ) and fear of contagion/transmission scale ( $85.61 \pm 25.56$ ). The total mean scores of the participants were found to be  $16.65 \pm 12.16$  for depression,  $16.17 \pm 11.29$  for anxiety,  $18.38 \pm 11.72$  for stress and  $51.22 \pm 33.82$  for Depression, Anxiety and Stress.

Table 3 shows the distribution of the mean of the sub-dimensions of FCTS and DASS given according to the descriptive features. The female students' scores on fear of contagion by contact, fear of social contagion and fear of contagion in healthcare among sub-dimensions of FCTS were higher than those of males, and there was a statistically significant difference between them ( $p < .05$ ). Although the scores on the abstract fear of contagion were lower in male students, it was not found to be statistically significant ( $p > .05$ ). The mean scores of female students were found to be higher than the mean scores of male students on DASS sub-dimensions. The

**TABLE 1** Distribution of students' FCTS and DASS mean scores according to descriptive characteristics (n: 3500)

| Variable                 | n    | %    | FCTS mean ± SD                          | DASS mean ± SD                 |
|--------------------------|------|------|---|--------------------------------|
| <b>Gender</b>            |      |      |   |                                |
| Male                     | 1314 | 37.5 | 82.96 ± 27.61                           | 48.48 ± 33.11                  |
| Female                   | 2186 | 62.5 | 87.21 ± 24.10                           | 52.86 ± 34.14                  |
| t/p                      |      |      | t: 4.616<br><b>p &lt; .001</b>          | t: 3.721<br><b>p &lt; .001</b> |
| <b>Age</b>               |      |      |   |                                |
| 18–22                    | 2759 | 78.8 | 85.05 ± 25.71                           | 51.96 ± 33.74                  |
| 23–27                    | 606  | 17.3 | 87.91 ± 24.16                           | 49.04 ± 33.59                  |
| 28–32                    | 77   | 2.2  | 87.89 ± 25.74                           | 45.18 ± 33.71                  |
| 33 and above             | 58   | 1.7  | 85.68 ± 30.69                           | 46.84 ± 38.40                  |
| F/p                      |      |      | F: 2.290<br>p: .076                     | F: 2.424<br>p: .064            |
| <b>Grade level</b>       |      |      |   |                                |
| Preparation <sup>a</sup> | 258  | 7.4  | 80.89 ± 29.25                           | 54.79 ± 35.09                  |
| First <sup>b</sup>       | 993  | 28.4 | 83.57 ± 27.14                           | 50.96 ± 33.63                  |
| Second <sup>c</sup>      | 1366 | 39   | 88.09 ± 24.19                           | 52.28 ± 33.88                  |
| Third                    | 390  | 11.1 | 85.34 ± 22.99                           | 49.05 ± 32.89                  |
| Fourth and above         | 493  | 14.1 | 85.58 ± 25.18                           | 48.64 ± 33.91                  |
| F/p                      |      |      | F: 7.046<br><b>p &lt; .001</b><br>c/a-b | F: 2.19<br>p: 0.068            |
| <b>Form of teaching</b>  |      |      |   |                                |
| 1. Teaching              | 2819 | 80.5 | 85.51 ± 25.18                           | 51.32 ± 33.61                  |
| 2. Teaching              | 681  | 19.5 | 86.03 ± 27.06                           | 50.79 ± 34.68                  |
| t/p                      |      |      | t: -.471<br>p: .637                     | t: .372<br>p: .710             |
| <b>Teaching area</b>     |      |      |   |                                |
| Health sciences          | 1583 | 45.2 | 85.85 ± 26.05                           | 51.34 ± 34.24                  |
| Liberal arts             | 600  | 17.1 | 85.62 ± 25.17                           | 53.33 ± 33.58                  |
| Science                  | 441  | 12.6 | 86.31 ± 24.45                           | 52.09 ± 34.42                  |
| Educational sciences     | 876  | 25   | 84.83 ± 25.49                           | 49.12 ± 32.84                  |
| F/p                      |      |      | F: 0.428<br>p: .733                     | F: 2.011<br>p: .110            |
| <b>Housing status</b>    |      |      |   |                                |
| With my family           | 1029 | 29.4 | 84.47 ± 26.41                           | 50.94 ± 33.84                  |
| With my friends          | 1674 | 47.8 | 86.01 ± 24.84                           | 50.76 ± 33.96                  |
| Alone                    | 797  | 22.8 | 86.26 ± 25.89                           | 52.54 ± 33.50                  |
| F/p                      |      |      | F: 1.490<br>p: .226                     | F: 0.795<br>p: .452            |
| <b>Chronic disease</b>   |      |      |   |                                |
| Yes                      | 304  | 8.7  | 85.97 ± 25.33                           | 57.88 ± 33.93                  |
| No                       | 3196 | 91.3 | 85.58 ± 25.58                           | 50.58 ± 33.74                  |
| t/p                      |      |      | t: .253<br>p: .801                      | t: 3.600<br><b>p &lt; .001</b> |

Bold indicates  $p < .05$ .

<sup>a</sup>Preparation.

<sup>b</sup>First.

<sup>c</sup>Second.

| Sub-dimensions                  | Median | Mean  | SD    | Cronbach's $\alpha$ |
|---------------------------------|--------|-------|-------|---------------------|
| Fear of contagion by contact    | 20     | 18.87 | 5.75  | .92                 |
| Abstract fear of contagion      | 19     | 19.12 | 6.86  | .89                 |
| Fear of social contagion        | 32     | 30.16 | 9.61  | .96                 |
| Fear of contagion in healthcare | 19     | 17.45 | 5.89  | .91                 |
| Total FCTS                      | 92     | 85.61 | 25.56 | .97                 |
| Depression                      | 15     | 16.65 | 12.16 | .95                 |
| Anxiety                         | 15     | 16.17 | 11.29 | .94                 |
| Stress                          | 17     | 18.38 | 11.72 | .95                 |
| Total DASS                      | 47     | 51.22 | 33.82 | .98                 |

TABLE 2 Distribution of sub-dimension scores of FCTS and DASS scales ( $n = 3500$ )

TABLE 3 Distribution of the mean scores of FCTS and DASS according to the descriptive characteristics of the students ( $n: 3500$ )

|                                 | Gender          | <i>n</i> | <i>X</i> | SD    | t Test   |      |          |
|---------------------------------|-----------------|----------|----------|-------|----------|------|----------|
|                                 |                 |          |          |       | <i>T</i> | SD   | <i>p</i> |
| Fear of contagion by contact    | Female          | 2186     | 19.45    | 5.46  | 7.424    | 3498 | .000     |
|                                 | Male            | 1314     | 17.93    | 6.09  |          |      |          |
| Abstract fear of contagion      | Female          | 2186     | 19.23    | 6.58  | 1.174    | 3498 | .024     |
|                                 | Male            | 1314     | 18.94    | 7.30  |          |      |          |
| Fear of social contagion        | Female          | 2186     | 30.82    | 9.14  | 5.112    | 3498 | .000     |
|                                 | Male            | 1314     | 29.06    | 10.24 |          |      |          |
| Fear of contagion in healthcare | Female          | 2186     | 17.70    | 5.70  | 3.240    | 3498 | .001     |
|                                 | Male            | 1314     | 17.02    | 6.18  |          |      |          |
| Total FCTS                      | Female          | 2186     | 87.21    | 24.1  | 4.616    | 3498 | .000     |
|                                 | Male            | 1314     | 82.96    | 27.61 |          |      |          |
| Depression                      | Female          | 2186     | 16.94    | 12.16 | 1.891    | 3498 | 0.59     |
|                                 | Male            | 1314     | 16.16    | 11.75 |          |      |          |
| Anxiety                         | Female          | 2186     | 16.77    | 11.34 | 4.088    | 3498 | .000     |
|                                 | Male            | 1314     | 15.16    | 11.15 |          |      |          |
| Stress                          | Female          | 2186     | 19.14    | 11.91 | 4.943    | 3498 | .000     |
|                                 | Male            | 1314     | 17.15    | 11.30 |          |      |          |
| Total DASS                      | Female          | 2186     | 52.86    | 34.14 | 3.721    | 3498 | .000     |
|                                 | Male            | 1314     | 48.48    | 33.11 |          |      |          |
|                                 | Chronic disease | <i>n</i> | <i>X</i> | SD    | <i>t</i> | SD   | <i>p</i> |
| Depression                      | Yes             | 304      | 18.41    | 12.23 | 2.674    | 3498 | .008     |
|                                 | No              | 3196     | 16.48    | 11.98 |          |      |          |
| Anxiety                         | Yes             | 304      | 18.78    | 11.21 | 4.234    | 3498 | .000     |
|                                 | No              | 3196     | 15.92    | 11.27 |          |      |          |
| Stress                          | Yes             | 304      | 20.68    | 11.77 | 3.564    | 3498 | .000     |
|                                 | No              | 3196     | 18.18    | 11.69 |          |      |          |
| Total DASS                      | Yes             | 304      | 57.88    | 33.93 | 3.6      | 3498 | .000     |
|                                 | No              | 3196     | 50.58    | 33.74 |          |      |          |

difference between DASS subscale scores of female students and male students was statistically significant ( $p < .05$ ). Comparing the students with and without chronic disease in terms of the DASS subscale scores, the scores of the students with chronic disease were

higher in all of the Depression, Anxiety and Stress subscales and the difference was statistically significant ( $p < .05$ ).

According to the results of the Pearson correlation analysis, a significant and positive relationship was found between FCTS and

DASS ( $r = .088, p < .001$ ). Examining the relationships between DASS sub-dimensions and FCTS, FCTS had the strongest relationship with stress ( $r = .094, p < .001$ ). Table 4 shows the correlation analysis results.

## 4 | DISCUSSION

All individuals in society have been adversely affected by the COVID-19 pandemic process, but this process has been more emotionally challenging and stressful for some vulnerable groups. University students are among the vulnerable groups because they are at risk for mental and psychological health problems (Wang et al., 2020). Studies reveal that even in non-pandemic conditions, university students experience significant anxiety and depression due to academic pressure and economic difficulties (Ibrahim et al., 2013; Saleh et al., 2017). This study was carried out to determine the effect of the fear of contagion/being contagious on the depression, anxiety and stress levels of university students during the COVID-19 pandemic process. The findings obtained from the study were discussed in line with the literature.

In the early part of the COVID-19 pandemic process, the general thought was that the elderly and the immunocompromised population were more vulnerable to the pandemic. However, as time went by, contrary to the popular belief, it was seen that it also negatively affected the young population (Kumar et al., 2021). This study revealed that female students experienced stress and depression at a moderate level, while male students experienced stress at a mild level and depression at a moderate level. Anxiety levels were found to be advanced in both genders. This study also revealed that the difference between the DASS scores of female and male students was statistically significant, and the stress, depression and anxiety levels of women were higher than those of men. Similarly, other studies conducted with university students reported that the students were highly anxious, while the depression, anxiety and stress levels of female students were higher than male students (Aylie et al., 2020; Debowska et al., 2020; Dosil-Santamaria et al., 2022; Ghazawy et al., 2021; Wang et al., 2020). The fact that women's anxiety and

stress levels are also higher than men's during non-pandemic periods may explain this result. Biological factors have quite a big role in these differences. For example, it has been reported that women are more sensitive to stress hormones and threats, and are less likely to use coping strategies in negative situations (Tang et al., 2017; Zhou et al., 2013). Studies conducted during non-pandemic periods support this finding (Debowska et al., 2020; Gentry et al., 2007; McLean & Anderson, 2009). In addition to biological factors, social factors such as women's position in society, conflicting work, family and social roles, the duties they undertake in the care of children, the elderly, the sick and family members, inequalities in the employment environment, and more poverty experience make women more sensitive to stress. The adverse conditions of the pandemic may have deepened the difference between male and female students. Factors such as increased caregiving responsibility during the pandemic period, worrying about the health of family and friends, and the feeling of loneliness due to social isolation may have affected female students more than male students (Debowska et al., 2020). However, contrary to our study, there are also studies that argue that there is no relationship between gender and psychological problems (Alqudah et al., 2021; Cao et al., 2020).

In our study, no statistically significant difference was found between DASS mean scores in terms of age and field of study. However, some studies reported that the depression and anxiety levels of students studying in the field of health were higher than those in other fields (Debowska et al., 2020; Sancar et al., 2018). Contrary to our study, Debowska et al. (2020) found in their study that students aged 18–24 experienced more depression and anxiety and had suicidal tendencies than those over the age of 25, and students studying in the healthcare field experienced more depression, anxiety and stress compared to those in the social fields. On the contrary, Ojewale (2020) stated that students studying in the field of healthcare had lower anxiety levels.

In the COVID-19 pandemic, especially the fear of contagion/being contagious can affect the mental and spiritual health of individuals. The fear of contagion is considered to be the fear of coming into direct or indirect contact with people or substances considered to be infected or harmful, but this fear may not always

TABLE 4 Correlation between students' FCTS and DASS sub-dimension scores (n: 3500)

| Değişkenler                        | 1 | 2     | 3      | 4      | 5      | 6      | 7      | 8      | 9      |
|------------------------------------|---|-------|--------|--------|--------|--------|--------|--------|--------|
| 1. Fear of contagion by contact    | – | .75** | .79**  | .76**  | .90**  | .53**  | .058** | .077** | .065** |
| 2. Abstract fear of contagion      |   | –     | .710** | .765** | .881** | .076** | .101** | .062** | .082** |
| 3. Fear of social contagion        |   |       | –      | .803** | .931** | .056** | .057** | .094** | .071** |
| 4. Fear of contagion in healthcare |   |       |        | –      | .909** | .092** | .107** | .108** | .106** |
| 5. Total FCTS                      |   |       |        |        | –      | .075** | .086** | .094** | .088** |
| 6. Depression                      |   |       |        |        |        | –      | .884** | .903** | .964** |
| 7. Anxiety                         |   |       |        |        |        |        | –      | .905** | .962** |
| 8. Stress                          |   |       |        |        |        |        |        | –      | .970** |
| 9. Total DASS                      |   |       |        |        |        |        |        |        | –      |

\*\* $p < .01$ .

be due to a tangible external source. Mental fear of contagion, which is defined as an abstract fear of contagion, may also develop in people (Koç & Bilgehan, 2021; Rachman, 2006). In our study, it was determined that although the participants' abstract fear of contagion was low, they still had an intense fear of contagion/being contagious by contact, in social areas and healthcare areas. Female students' fear of being contagious by contact, fear of being contagious in social areas and fear of being contagious in healthcare were higher than males. This finding shows that students are as worried about others as they are worried about themselves. There are studies supporting this finding of our study (Dosil-Santamaria et al., 2022). The fact that many individuals infected with COVID-19 do not show symptoms and the potential for an asymptomatic infected individual to transmit the disease to other individuals without being aware of it can be alarming especially for university students who have little tolerance for uncertainty. Therefore, the fear of being responsible for harming someone else can increase the fear of infecting others and, accordingly, the stress and anxiety of the individual (Dennis et al., 2021; McKay et al., 2004).

In this study, a significant and positive relationship was found between the fear of contagion and the levels of depression, anxiety and stress. Its strongest relationship was with stress levels. Similar to our study, Yang et al. (2021) found that the fear of contagion was positively related to stress, and also stated that the fear of contagion was negatively related to physical and psychological health. On the contrary, Di Crosta et al. (2020) determined that the fear of contagion was one of the strong predictors of post-traumatic stress disorder related to the COVID-19 pandemic. This can be explained by the fact that individuals feel uncertain and anxious about the negative consequences of them getting COVID-19 on their own health, the health of their families, their progress in education and their professional future. In addition, the fear of being stigmatised by their social environment can also trigger this situation (Vilca et al., 2022).

Fear of contagion/being contagious is closely related to individual characteristics (Koç & Bilgehan, 2021; Rachman, 2006). Individual differences in fear of contagion/being contagious can be strong predictors of anxieties, particularly regarding the COVID-19 pandemic. For example, in our study, the fear of contagion/being contagious in students with chronic disease was found to be higher than in students without chronic disease. In the early stages of the pandemic, individuals with chronic lung diseases, including asthma and allergies, were reported to be at high risk of developing severe COVID-19 symptoms (Di Riso et al., 2021). In addition, recent studies emphasise that the presence of multiple chronic diseases increases the risk of adverse complications of COVID-19 approximately 10 times (Emami et al., 2020; Sinclair & Abdelhafiz, 2020). As expected, students with chronic illnesses were also found to have higher levels of depression, anxiety and stress than students without chronic illnesses, as people with chronic illnesses are more vulnerable to COVID-19 complications.

Similar to our study, there are studies stating that university students with chronic diseases have higher levels of stress, anxiety and depression (Alqudah et al., 2021; Aylie et al., 2020; Dosil-Santamaria et al., 2022; Ghazawy et al., 2021; Ojewale, 2020; Woon et al., 2021). These students may be more susceptible to the pandemic, as having a history of chronic illness can exacerbate the effects of COVID-19. Additionally, these students may need more psychological support (Zhang et al., 2021).

University students face strict measures to prevent the spread of the COVID-19 pandemic, so it is par for the course that they have high levels of stress, anxiety and depression, or experience health problems. However, despite the fact that our study was conducted in a period when the pandemic and isolation measures were gradually decreasing in Turkey, the majority of the population was vaccinated, and schools were resuming face-to-face education, the fact that students had high levels of stress, anxiety and depression, even 2 years after the pandemic, is the most striking finding of our research. This situation makes us think that the negative effects of the pandemic, which has taken the world under its influence in a short time, may continue for a long time, especially in risky and vulnerable groups.

## 5 | CONCLUSION

This study revealed that the depression, anxiety and stress levels of university students were above normal, and these results were mostly associated with females, those with a chronic disease and high fear of contagion/being contagious. Proactive steps should be taken to support students' mental health and academic success in times of crisis when uncertainties prevail, during the COVID-19 pandemic in the first place.

In future research, it is recommended to investigate the relationship between different variables such as being diagnosed with COVID-19, being in the role of caregiver and fear of contagion, depression, anxiety and stress levels, and to conduct qualitative studies.

### 5.1 | Limitations

One of the strongest aspects of this study is the large sample size consisting of university students in Turkey. However, there are some limitations to our study. First, since the study was cross-sectional, it is difficult to determine whether any of the psychological consequences were pre-existing. Second, we used an online questionnaire, which may lead to non-response in study results. However, we think that the potential for bias has been reduced since the questionnaire forms were available approximately for 4 weeks to be filled. Third, there are several other variables that influence the anxiety, stress and depression of university students and that were not investigated in the present study.



## 6 | RELEVANCE TO CLINICAL PRACTICE

- The depression, anxiety and stress levels of university students were above normal.
- As the fear of contamination and contagion increases, the level of depression, anxiety and stress increases.
- Those with chronic diseases have high levels of depression, anxiety and stress.
- Our findings provide insights into stress and mental health among college students during the COVID-19 pandemic.
- The findings of this study may be useful for precautionary plans to support the psychological health of university students after the COVID-19 pandemic and in the fight against possible new pandemics. Considering the findings of our study, trainings should be planned for young people in general and university students in particular to deal with depression, anxiety, stress and fears.

### AUTHOR CONTRIBUTIONS

Study conception, data analysis, manuscript writing, and final version approval: MDI; data analysis and final version approval: AG; manuscript writing and final version approval: EÖ; study conception and final version approval: YU.

### ACKNOWLEDGEMENTS

Each author listed on the manuscript has seen and approved the submitted version of the manuscript and takes full responsibility for the manuscript.

### FUNDING INFORMATION

The author(s) received no financial support for the research, authorship and/or publication of this article.

### CONFLICT OF INTEREST

The author(s) declared no potential conflicts of interest concerning the research, authorship and/or publication of this article.


### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

### ETHICAL APPROVAL

We warrant that the material contained in the manuscript represents original work, has not been published elsewhere and is not under consideration for publication elsewhere. Ethical approval for the study was obtained from the Ethical Review Board of the Karabük University in Turkey (dated 12.04.2022 and 2022/877).

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**How to cite this article:** Iskender, M. D., Gülsoy, A., Özcan, E., & Uyan, Y. (2022). The effect of fear of contagion/being contagious on depression, anxiety and stress levels of university students during the COVID-19 pandemic. *Journal of Clinical Nursing*, 00, 1–11. <https://doi.org/10.1111/jocn.16602>